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**VOLUME I  
FOCUSED REMEDIAL INVESTIGATION REPORT  
FOR  
RICHARDSON FLAT TAILINGS SITE**

**SITE ID: UT980952840**

**SEPTEMBER 2, 2004**

**Prepared for:**

**United Park City Mines Company  
P.O. Box 1450  
Park City, UT 84060**

**Prepared by:**

**Resource & Environmental Management Consultants d.b.a. RMC  
8138 South State Street, Suite 2A  
Midvale, Utah 84047**

**Phone: (801) 255-2626  
Fax: (801) 255-3266**

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## EXECUTIVE SUMMARY

This Focused Remedial Investigation ("RI") Study Report details the results of the site characterization activities conducted at the Richardson Flat Tailings Site near Park City, Utah (the "Site"). The Site is an inactive mill tailings impoundment owned by United Park City Mines Company ("United Park"). United Park conducted the RI pursuant to an Administrative Order on Consent for a Focused Remedial Investigation /Feasibility Study, dated September 28, 2000, U. S. EPA Docket No. CERCLA-8-2000-19 (the "AOC"). The work was performed in accordance with the RI Workplan and Sampling and Analysis Plan ("SAP") that was prepared by United Park, in coordination with and approved by the U. S. Environmental Protection Agency (the "EPA") and the Utah Division of Environmental Response and Remediation (the "UDERR").

The Site is not listed on the National Priorities List, but had previously been proposed for listing by the EPA in 1988 and 1992. In 1999, the EPA and United Park initiated discussions regarding the additional site characterization work that would be needed to assess contamination conditions at, and remedial alternatives (if any) that may be required for the Site. Those discussions resulted in the issuance of the AOC and the performance of the RI work.

The initial RI sampling activities were conducted during the period of April 2001 to July 2002. Soil, surface water, groundwater, sediment, and tailings samples were collected and analyzed. During the summer of 2003 two phases of ecological sampling were conducted to assess ecological conditions in the pond and wetland area located at the base of the embankment. Sediment, surface water, sediment porewater, vegetation, fish and macroinvertebrate samples were collected and analyzed. The RI study Report presents the findings from these data gathering efforts, as well as certain data gathered from previous investigations conducted earlier by United Park and the EPA. The key findings from the RI activities, which are described in greater detail in the RI Study Report, include the following:

- On-site soils data indicate that the tailings cover is greater than one foot deep on the southern half of the impoundment, and more that six inches deep on the northern half of the impoundment. Except for a few localized areas, average lead concentrations in surface cover soils are less than 400 ppm. Data collected from soils in areas outside of the tailings impoundment area indicate the extent of wind-blown tailings is generally limited to areas immediately adjacent to the tailings impoundment area.
- Surface and shallow groundwater samples were collected from an adjacent and upstream area owned by United Park, referred to as the "Floodplain Tailings" area, to evaluate shallow groundwater and surface water conditions in and near Silver Creek. The data collected in this evaluation of Silver Creek was also used to evaluate Silver Creek as required in the AOC. The data demonstrate that

offsite sources of metals contamination appear to be impacting surface and groundwater quality in and near Silver Creek upstream and westerly of the Richardson Flat tailings impoundment. Water elevation and water quality data indicate that the Floodplain Tailings appear to be contributing some, but not all, of certain metals contamination to Silver Creek surface and groundwater systems in the area adjacent to and within Silver Creek west of the main Richardson Flat impoundment. Other sources of metals contamination located upstream of the Site are also impacting water quality in Silver Creek, as well. The Floodplain Tailings are part of the Upper Silver Creek Watershed Investigation. Water elevation and water quality data indicate that Silver Creek is impacting a portion of the wetland area.

- Groundwater at the Site has been detected in tailings both inside and outside of the impoundment area, in shallow alluvial aquifers beneath the Site and in the Silver Creek alluvial aquifer. Based on hydrogeologic studies, there appears to be no hydraulic connection between the groundwater found in the impounded Richardson Flat tailings and in the underlying shallow aquifers or within the Silver Creek alluvial aquifer. Groundwater quality data indicate that the alluvial aquifer underlying Silver Creek is not chemically similar to groundwater encountered in the tailings, or to surface water collected from the South Diversion Ditch.
- Sample data show that the diversion ditch and wetland sediments contain metals at all locations sampled, and that a transfer of metals from the sediments to surface water does not appear to be occurring within the diversion ditch and wetland area.
- Tailings data indicate that there are more alkaline-generating compounds in the tailings than acid-generating compounds. The average pH of the tailings is 7.5 S.U.. Thus, under current operating conditions, it is unlikely that the tailings will become acidic. Data obtained from unsaturated tailings indicate that metals, such as lead and zinc, have a potential to leach from tailings under unsaturated conditions. However, groundwater data collected from wells completed in tailings at the site suggest that any metals that may have previously leached from unsaturated tailings would have since become immobilized upon encountering underlying saturated tailings.

EPA has conducted a Baseline Human Health Risk Assessment ("BHHRA") utilizing the data obtained from the RI and prior investigations. The results of the BHHRA indicate that the Site does not present a risk to recreational visitors under current land use designations. EPA has conducted a Baseline Ecological Risk Assessment (BERA). The results of the BERA indicate that metals in surface water and sediments at the Site may have adverse effects on aquatic and semi-aquatic wildlife. Based on the data presented in this RI, the EPA will determine final Preliminary Remediation Goals for both human health and ecological receptors for the Site.

### **1.2.1 Site Description**

The property is owned by United Park and consists of approximately 650 acres in a small valley in Summit County, Utah, located one and one-half miles northeast of Park City, Utah (Figure 1-1). The tailings impoundment covers approximately 160 acres in the northwest corner of the Property and lies within the northwest quarter of Section 1 and northeast quarter of Section 2, Township 2 South, Range 4 East, Summit County, Utah (Figure 1-2). Figure 1-3 shows the Site configuration, topography and boundary.

### **1.2.2 Site History**

United Park was formed in 1953, with the consolidation of Silver King Coalition Mines Company and Park Utah Consolidated Mines Company, both publicly traded mining companies at the time. Tailings were first placed at the Site prior to 1950. The mill tailings present at the Site consist mostly of sand-sized particles of carbonate rock with some minerals containing silver, lead, zinc and other metals. While few specific details are known about the exact configuration and operation of the historic tailings pond, certain elements of prior operations are apparent. From time to time, tailings were transported to the Site through three distinct low areas on the southeast portion of the Site. Over the course of time, tailings materials also settled out into these three low areas that were ultimately left outside and south of the present impoundment area as constructed in 1973-74. An embankment constructed along the western area of the Site also appears to have been in place as part of the original design and construction of the tailings pond, but few details are known of the original embankment.

In 1970, Park City Ventures (PCV), a joint venture partnership between Anaconda Copper Company (Anaconda) and American Smelting and Refining Company (ASARCO), entered into a lease agreement with United Park. One aspect of the lease was to use the Site for disposal of additional mill tailings resulting from renewed mining in the area. PCV contracted with Dames & Moore to provide construction specifications for reconstructing the Site for continued use as a tailings impoundment (Dames & Moore, 1974). The State of Utah approved PCV's proposed Site operations based on Dames & Moore's design, construction, and operation specifications. Before disposing of tailings at the Site, PCV installed a large, earth embankment along the western edge of the existing tailings impoundment and constructed perimeter containment dike structures along the southern and eastern borders of the impoundment to allow storage of additional tailings (See Figure 1-3). PCV also installed a diversion ditch system along the higher slopes north of the impoundment and outside of the containment dike along the east and south perimeter

of the impoundment to prevent surface runoff from the surrounding land from entering the impoundment. Portions of the ditch located on the south and east side of the impoundment (South Diversion Ditch, Figure 1-3) appear to have been constructed in or through tailings materials. PCV also installed groundwater monitoring wells near the base of the main embankment, as part of the required approval process by the State of Utah.

During the 1970's PCV conveyed tailings to the impoundment by a slurry pipeline from its mill facility located south of the Site. Over the course of its operations, PCV disposed of approximately 420,000 tons of tailings at the Site. In addition to developing construction specifications for the Site, Dames & Moore also provided PCV with design specifications for the earthen embankment as well as operating requirements for the tailings pond and slurry line, that were also approved by the State of Utah as a requirement for operating the Site. Dames & Moore recommended, among other things, that PCV operate the slurry line in such a way to deposit tailings around the perimeter of the tailings impoundment and moving towards the center of the impoundment (Dames & Moore, 1974 at p. 21). This is a common operating practice in the industry. Unfortunately, PCV failed to follow the Dames & Moore requirement and operated the slurry line in such a way that a large volume of tailings were placed near the center of the impoundment in a large, high-profile, cone-shaped feature. PCV also failed to construct the main embankment in accordance with specifications provided by Dames and Moore.

Between 1980 and 1982, Noranda Mining, Inc. (Noranda) leased the mining and milling operations and placed an additional, estimated 70,000 tons of tailings at the Site. After cessation of operations by Noranda in 1982, prevailing winds cut into the cone-shaped feature of tailings materials resulting in some tailings materials becoming wind-borne. Had the PCV slurry line been operated according to the Dames & Moore specifications, the high-profile tailings cone would not have existed and prevailing winds would not have been a significant potential exposure pathway at the Site. No new tailings have been placed at the Site since Noranda ceased its operations. A soil cover has been placed on the impoundment. The embankment has remained stable since the cessation of activities at the Site. Currently the embankment does not exhibit any signs of instability.

### **1.2.3 Previous Investigations**

Since the 1970s, PCV, Noranda, EPA, and United Park have conducted numerous environmental investigations relating to the Site. Beginning in the 1970s, PCV conducted groundwater, tailings pond,

and embankment design studies that focused on the construction of containment structures that would accommodate additional tailings. In 1980, Noranda conducted studies to determine the current condition of the impoundment and the potential for future enlargement of the impoundment. In the 1980s and early 1990s, EPA conducted studies of groundwater, surface water, and air quality to determine whether Site contaminants posed threats to human health or the environment to require listing of the Site on the National Priorities List (NPL). United Park initially conducted studies in response to EPA's proposal to list the Site on the NPL. More recently, United Park has obtained data focusing on the characterization of Site hydrogeology and surface water quality.

EPA has proposed listing the Site on the NPL on two occasions. In 1988, EPA proposed listing the Site on the NPL based on the Site's Hazardous Ranking System (HRS) score. After considering public comments, EPA ultimately declined to list the Site by removing it from the proposed NPL. By 1992, the HRS scoring system had been revised and at that time, EPA conducted additional studies and rescored the Site and again proposed that the Site be placed on the NPL. Based on the new proposal to list the Site, the EPA Emergency Response Branch (ERB) conducted additional investigations on the Site and determined that conditions did not warrant emergency removal action. In 1994, the Agency for Toxic Substances and Disease Registry (ATSDR) in their *Preliminary Public Health Assessment Addendum on the Richardson Flat Tailings* found that the Site posed "no apparent public health hazards due to past or present exposure." The ATSDR did, however, consider Richardson Flat an "indeterminate public health hazard" in the future due to the potential for residential development on or near areas where significant levels of contamination may be found. United Park's future land use plan includes provisions that residential development will not occur in these areas.

The EPA has yet to list the Site on the NPL, but the Site's listing on CERCLIS remains in effect. While no formal regulatory action has occurred with respect to the Site since the second proposed listing, United Park has continued its efforts to investigate and close the Site by improving the soil cover, maintaining the diversion ditches, and collecting surface water and groundwater data.

This section summarizes past investigation activities and existing Site data. The reports and data from these investigations were very useful in determining the scope of additional investigative activities needed to bring final closure to the Site. From 1985 to 1988 and from 1992 to 1993, the EPA conducted and reported on investigations at the Site. Because past investigation activities by PCV, Noranda and United

Park were performed without EPA oversight and with an unknown degree of QA/QC, the results from such investigations are incorporated into this Focused RI as screening level data.

#### **1.2.3.1 Air Monitoring Investigations**

Due to concerns over wind-blown tailings resulting from the cone-shaped tailings feature created by past operators, EPA conducted air monitoring investigations on two separate occasions. Due to United Park's subsequent placement of the full, vegetated clay soil cover, data from these investigations are no longer directly relevant but are reported here to support United Park's proposed study of offsite wind blown tailings.

In 1985, when approximately 40 percent of all of the tailings on the Property had been covered with the soil cover, Ecology and Environment, Inc. (E&E), a contractor working for EPA, collected air data. Four high volume air samplers were located on or immediately adjacent to the tailings impoundment and one was located approximately one-half mile southeast of the Site. Data were collected at the Site over a five-day period and the filters from the samplers were analyzed for arsenic, cadmium, lead and zinc. A meteorological station was installed at the Site and wind direction, air temperature, barometric pressure and relative humidity data were collected. The prevailing wind direction measured at that time was from the northwest to southeast (E&E, 1987 at p. 3). According to E&E's analytical data, increases were noted for all metals measured in downwind versus upwind monitoring locations. Review of the data in Table 1 of the 1987 E&E report shows that 52% of arsenic, 92% of cadmium, 17% of lead and 14% of zinc measured on the air filters at the Site were below the laboratory's detection limits.

E&E again conducted air monitoring in 1992 at five locations. The installation of the cover within the impoundment had progressed to the point where all of the exposed tailings had been covered, with the exception of one area of tailings where salt grass and other native plant species were growing and had stabilized the tailings. These new air monitoring activities showed no detectable levels of arsenic, cadmium or lead. Trace levels of zinc were detected in four of the seventeen samples collected. There are no ambient air quality standards for zinc. The significant reduction in the concentration of target analytes from these two air-monitoring programs can be explained by United Park's efforts to cover the remaining areas of the impoundment. Since 1992, all of the exposed tailings in the impoundment have been covered, including the area where salt grass was growing.